PS 7

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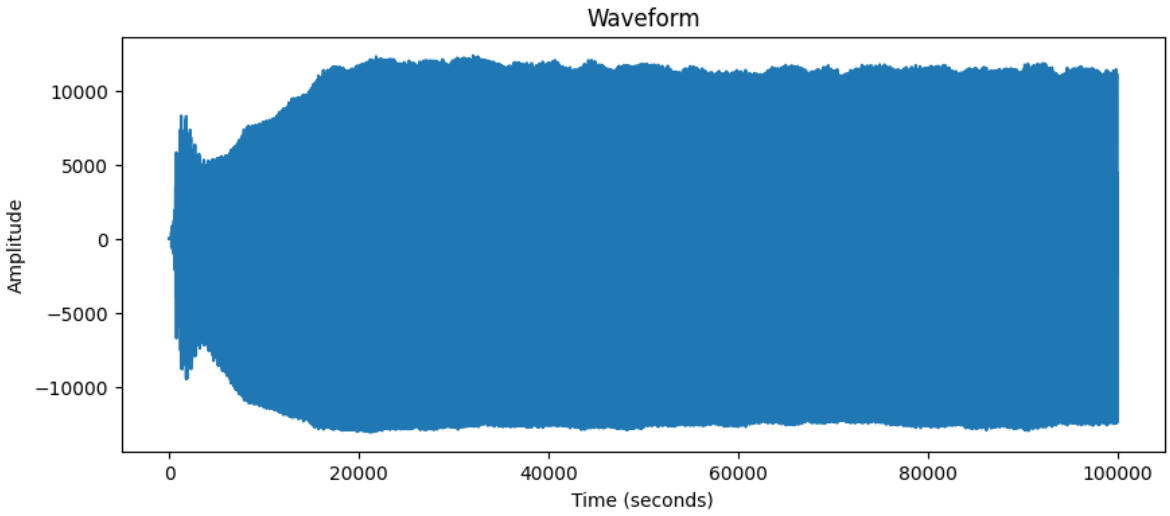
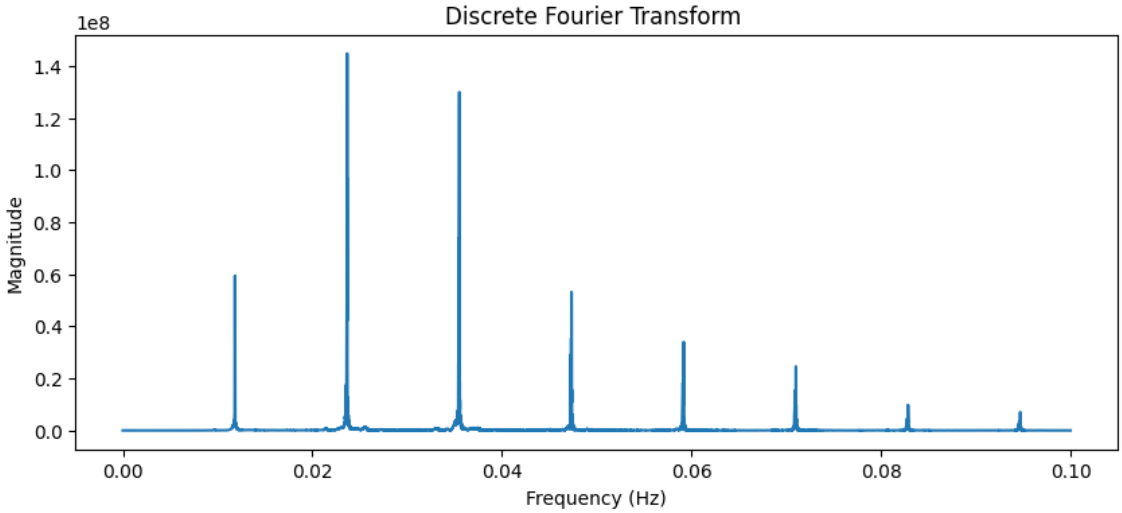
1 7.3

For this question, I wrote a program to read the 'trumpet.txt' file. Signal can be directly got from the file, and time is the length of those signals. Frequency can be got from the method np.fft.fftfreq(len(signal)) and use np.fft calculate the Fourier transform. With the frequency and magnitude, we can plot the discrete Fourrer transform graph.

The first graphs shows the signal versus the time, which is the length of the signal. The result will be a waveform.

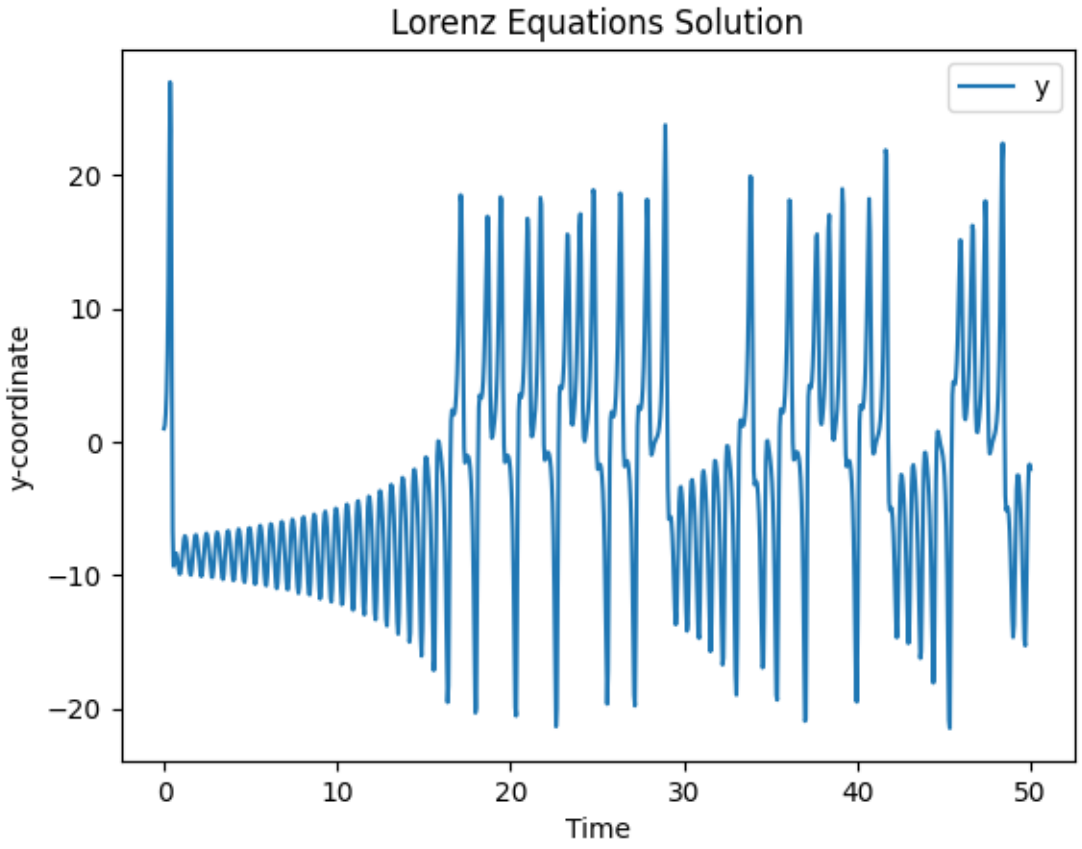


The second graph shows the discrete Fourier transform.

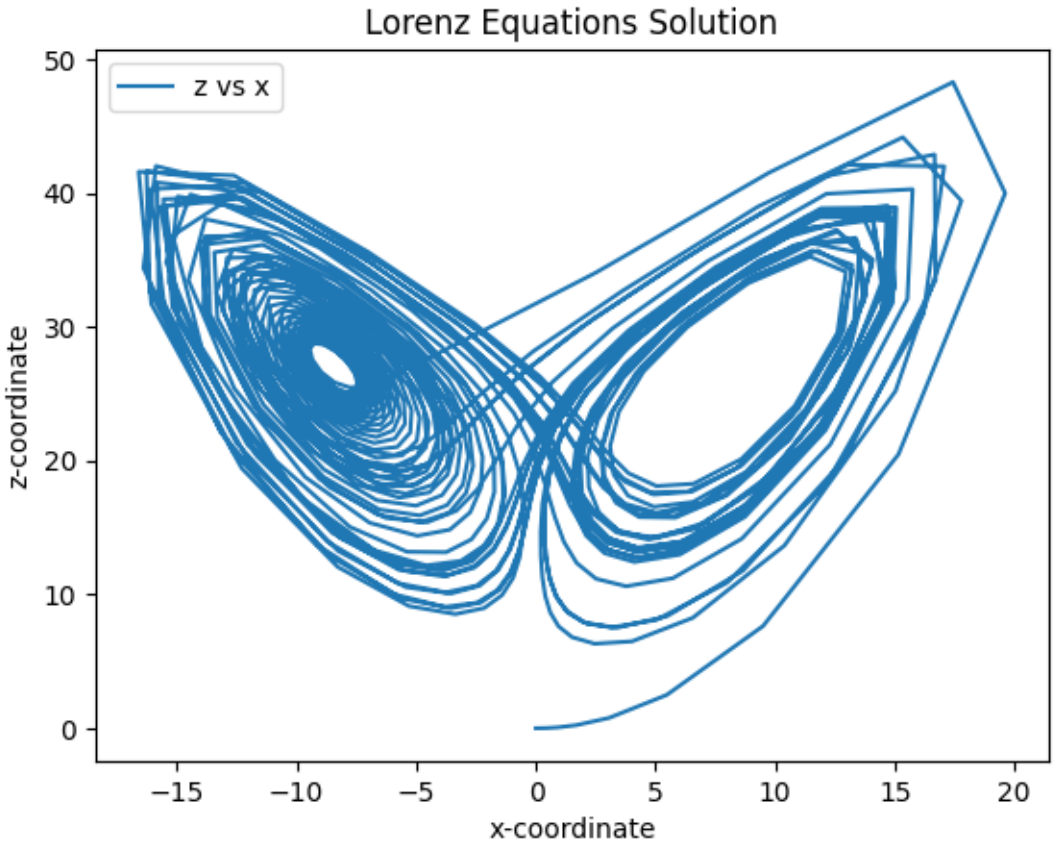


2 8.3

To solve Lorenz equation, I used the method 'solve-ivp', which is a method in python to solve the initial value problems. Knowing the values of those constants, initial conditions and time range, we can put those parameters and Lorenz function we have defined into the 'solve-ivp' method, and we can get the solutions (x, y,z). The first graph is the variables y VS time.



The second graphs shows the change of z values with respect to x values, we can find the plot looks like a lop-sided butterfly.


Lorenz Equations Solution
z vs x
z-coordinate
x-coordinate
50
40
30
20
10
0
−15
−10
−5
0
5
10
15
20